

U.S. Patent Application Serial No. 10/518,216
Preliminary Amendment

CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claim 1 (Previously Presented): A phosphor comprising a silicon-containing solid matrix and semiconductor superfine particles dispersed therein at a concentration of 5×10^{-4} to 1×10^{-2} mol/L, said semiconductor superfine particles having a fluorescence quantum yield of 3% or greater and a diameter of 1.5 to 5 nm.

Claim 2 (Original): The phosphor according to claim 1, wherein the silicon-containing solid matrix is a glass matrix formed by a sol-gel process.

Claim 3 (Original): The phosphor according to claim 2, wherein the silicon-containing solid matrix is a glass matrix formed by a sol-gel process using an organoalkoxysilane.

Claim 4 (Original): The phosphor according to claim 3, wherein the organoalkoxysilane is a compound expressed by the formula:



wherein X is a group expressed by $CH_2=CH-$, an oxirane-containing group, a group expressed by $H_2NC_mH_{2m}-$, a group expressed by $CH_2=C(CH_3)COOC_pH_{2p}$, a group expressed by

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$\text{HSC}_q\text{H}_{2q}$, or a phenyl group; R^1 is a lower alkyl group; n is 1, 2, or 3; m is an integer from 1 to 6; p is an integer from 1 to 5; and q is an integer from 1 to 10.

Claim 5 (Original): The phosphor according to any one of claims 1 through 4, wherein the semiconductor superfine particles are substantially monodispersed in the silicon-containing solid matrix.

Claim 6 (Original): The phosphor according to claim 5, wherein the semiconductor superfine particles comprise at least one member selected from the group consisting of cadmium telluride, zinc telluride, zinc selenide, cadmium selenide, cadmium sulfide, indium arsenide, and indium phosphide.

Claim 7 (Original): The phosphor according to claim 6, wherein the semiconductor superfine particles comprise cadmium telluride, and the superfine particles are obtainable by adding a surfactant to an aqueous solution of cadmium perchlorate, adding hydrogen telluride or sodium hydrogen telluride, and then refluxing the mixture.

Claim 8 (Original): The phosphor according to claim 1, wherein the concentration of semiconductor superfine particles in the silicon-containing solid matrix is 1×10^{-3} to 8×10^{-3} mol/L.

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Claim 9 (Withdrawn): A light-emitting device comprising the phosphor according to claim 1, and a light source for emitting excitation light with an intensity of 3 to 800 W/cm².

Claim 10 (Withdrawn): A light-emitting device comprising the phosphor according to claim 1, and a light source selected from the group consisting of a mercury lamp, a semiconductor light-emitting diode, a semiconductor laser, and a solid-state laser.

Claim 11 (Withdrawn): The light-emitting device according to claim 10, wherein the light source is a semiconductor light-emitting diode, semiconductor laser, or solid-state laser.

Claim 12 (Withdrawn): The light-emitting device according to any one of claims 9 through 11, wherein the light source is an ultraviolet semiconductor light emitting diode with an excitation wavelength of 200 nm or greater but less than 400 nm, or an ultraviolet semiconductor laser with an excitation wavelength of 200 nm or greater but less than 400 nm.

Claim 13 (Withdrawn): The light-emitting device according to any one of claims 9 through 12, wherein the light source is an intermittently pulsing light source.

Claim 14 (Withdrawn): The light-emitting device according to any one of claims 9 through 13, wherein the optical density (OD) of the phosphor according to claim 1 at the excitation

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wavelength is $0.7 < OD < 5$.

Claim 15 (Withdrawn): The light-emitting device according to any one of claims 9 through 14, wherein the light-emitting device is a display panel or a light.

Claim 16 (Withdrawn): A method for manufacturing a display panel, wherein a slurry containing pulverized phosphor according to claim 1, a water-soluble photosensitive resin, and water, is applied to a substrate, and the resin is cured by irradiation with light.

Claim 17 (Withdrawn): A thin film comprising the phosphor according to claim 1.

Claim 18 (Withdrawn): The thin film according to claim 17, wherein the film thickness is 10 microns or less.

Claim 19 (Withdrawn): A method for forming a thin film comprising the phosphor according to claim 1, wherein the film is produced by a sol-gel process using an organoalkoxysilane.

Claim 20 (Withdrawn): A method for forming on a substrate a thin film comprising the phosphor according to claim 1, wherein the film is produced by a sol-gel process using an organoalkoxysilane.

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Claim 21 (Withdrawn): A method for manufacturing the phosphor according to claim 1, wherein the semiconductor superfine particles are fixed in the silicon-containing solid matrix and are then exposed to a reducing gas.

Claim 22 (Withdrawn): The method for manufacturing a phosphor according to claim 21, wherein the semiconductor superfine particles are fixed in the silicon-containing solid matrix by a sol-gel process using an organoalkoxysilane and are then exposed to hydrogen gas or hydrogen sulfide gas.

Claim 23 (Withdrawn): A phosphor obtainable by the manufacturing method according to claim 21 or 22.

Claim 24 (Withdrawn): A light-emitting device comprising the phosphor according to claim 23 and a light source for emitting excitation light with an intensity of 3 to 300 W/cm².

Claim 25 (Withdrawn): The light-emitting device according to claim 10, wherein the light source is an ultraviolet semiconductor light-emitting diode with an excitation wavelength of 200 nm or greater but less than 400 nm, or an ultraviolet semiconductor laser with an excitation wavelength of 200 nm or greater but less than 400 nm.

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Claim 26 (Withdrawn): The light-emitting device according to claim 10, wherein the light source is an intermittently pulsing light source.

Claim 27 (Withdrawn): The light-emitting device according to claim 10, wherein the optical density, (OD) of the phosphor according to claim 1 at the excitation wavelength is $0.7 < OD < 5$.

Claim 28 (Withdrawn): The light-emitting device according to claim 10, wherein the light-emitting device is a display panel or a light.

Claim 29 (New): The phosphor according to claim 1, wherein the semiconductor superfine particles have a surface coating.